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and one who enjoyed the friendship of all the great leaders in the movement—Huxley, Hooker, Scrope, Wallace, Lyell, and Darwin. Of those who were on terms of affectionate intimacy with both Charles Lyell and Charles Darwin, Professor Judd is perhaps the unique survivor. It is this intimate personal relationship to the chief actors in the great drama, combined with a peculiarly simple and graceful style of writing, which makes the fascination of this little book. At every turn of the page the reader is surprised by the reference to some remark of Lyell, Darwin, or Huxley, which sheds a flood of light upon the psychology of the whole movement.

The great success of the *Principles of Geology* seems in some measure to have been due to Lyell's study of the causes of failure of the *Theory of the Earth* by the illustrious Hutton, whose death occurred the year Lyell was born. On the basis of his extended observations, Hutton as early as 1785 wrote the oft-quoted, "I can see no evidence of a beginning, and no prospect of an end," a blunt statement which antagonized the church, then especially active in hunting heresy. Furthermore, his work was written in a heavy and cumbrous style. Profiting by this example, Lyell schooled himself in graceful, accurate, and forceful expression, and at some pains and with favoring fortune was able to avoid a clash with the established church. In no small measure this was due to an extremely favorable notice of his *Principles* in the *Quarterly Review*, then the champion of orthodoxy. With the geologists of the official Geological Survey, Lyell was less fortunate, and in spite of the general popularity of his epoch-making ideas, they were bitterly fought by the official class of geologists and only slowly won support in this field. Professor Judd's fascinating story of the coming of evolution should find a wide circle of readers, especially among students of natural science.

W. H. H.

North American Index Fossils: Invertebrates. By AMADEUS W. GRABAU AND HERVEY WOODBURN SHIMER. Vols. I and II. New York: A. G. Seiler & Co., 1909 and 1910.

With the rapid accumulation of special literature in the field of systematic paleontology, and the growing inaccessibility of many of the older works except to those having access to large libraries, it is ever becoming more and more difficult for the non-specialist to identify his species of fossils. At the same time, with the growing refinements in stratigraphy, it is ever becoming more important to the stratigraphic geologist to give close attention to the fossil faunas present in his rock formations, and to have accurate identifications of his fossils. It is, therefore, a pleasure to notice the appearance of such a work as *North American Index Fossils* by Grabau and Shimer.

In the two volumes of 853 and 909 pages respectively which comprise this work, approximately 1,500 genera and 4,000 species are defined, a large portion of the species being accompanied by illustrations incorporated in the text, the figures being copied from various sources for which credit is always given. The species selected for definition have been chosen to include, first, those most characteristic of important stratigraphic divisions, i.e., those of wide geographic and limited stratigraphic range; secondly, those having a wide geographic distribution even though their stratigraphic range is also great, i.e., the very common American species; and thirdly, forms which it is important that students of structural and anatomical paleontology should understand. The species are arranged chronologically under their respective genera, the genera being arranged systematically under their proper families, orders, classes, and phyla. Brief discussions of the structural features of each phylum and class are included, but except in the case of the Arthropoda, no definitions of subclasses or orders are given. Under each class is given a brief bibliography of the more important literature, which will be of use to such as wish to carry their studies beyond the limits of the work. A decided innovation is the inclusion of extensive analytical keys to the genera under each of the classes. These keys are probably the most elaborate ever attempted for fossil invertebrates, and will doubtless be of much value to those using the books, although it must be kept in mind always that such keys can never be of so great utility in the classification of fossils, which are frequently if not usually represented by more or less incomplete specimens, as in the classification of living organisms.

The closing pages of the second volume are given up to a series of appendices, as follows: A, Summary of North American Stratigraphy, Tables of Geological Formations (50 pages); B, Faunal Summary, Tables Showing Distribution of Species Described (50 pages); C, General Bibliography of North American Invertebrate Index Fossils and Fossil Faunas (1832–1909) (89 pages). In this bibliography the titles are arranged in accordance with the geological systems, those for each system being grouped geographically; D, Hints for Collecting and Preparing Fossil Invertebrates (16 pages); E, Glossary (36 pages) and General Index.

These volumes have been prepared primarily for the non-specialist, more especially for workers in stratigraphic geology who have not received special training in paleontology. For such workers, as well as for geological students in colleges and universities, and for amateur paleontologists and collectors of fossils, the volumes will prove to be of great value.

S. W.

Olenellus and Other Genera of the Mesonacidae. By CHARLES D. WALCOTT, Smithsonian Miscellaneous Collections, LV, No. 6.

In his memoir on the *Olenellus* fauna, published in the *Tenth Annual Report of the United States Geological Survey*, in 1891, Walcott recognized seven American and three foreign species of *Olenellus*, included in three subgeneric groups, *Olenellus* proper, *Mesonacis*, and *Holmia*. The present contribution represents the advance of knowledge concerning this highly interesting group of Cambrian trilobites since the appearance of the earlier memoir. Thirty-four species, including two varieties, are now recognized, besides two undetermined ones, thirty-six in all, arranged in ten groups which are given full generic rank, the entire group of forms being elevated to a family under the name *Mesonacidae*. Twenty-four of these forms are American and twelve foreign, the foreign representatives being known only from northwestern Europe.

With the restriction of the genus *Olenellus* to include only one group of these species, it comes about that this genus is no longer characteristic of the entire Lower Cambrian, as has commonly been assumed since the publication of the earlier memoir, but occurs only in the uppermost division of the series. In the present paper the Lower Cambrian is divided into four faunal zones, designated, beginning with the oldest, (1) *Nevadia* zone, (2) *Elliptocephala* zone, (3) *Callavia* zone, (4) *Olenellus* zone, each named from the leading Mesonacid genus present in the fauna. Aside from these four index genera the following are recognized: *Mesonacis* Walcott, *Holmia* Matthew, *Wanneria* n. gen., *Paedeumias* n. gen., *Peachella* n. gen., and *Olenelloides* Peach.

In their genetic relations the genera discussed are assumed to diverge along two lines from the primitive *Nevadia*. The one line includes *Callavia*, *Holmia*, and *Wanneria* in order, the last of which is supposed to give origin to *Paradoxides* of the Middle Cambrian. The second line of descent springing from *Nevadia* includes *Mesonacis*, *Elliptocephala*, *Paedeumias*, and *Olenellus* in serial order, the last of these genera giving origin on the one hand to *Peachella* and on the other hand to *Olenelloides*.